DEPARTMENT OF ECONOMICS AND FINANCE

COLLEGE OF BUSINESS AND ECONOMICS

UNIVERSITY OF CANTERBURY

CHRISTCHURCH, NEW ZEALAND

Saliency of Outside Options in the Lost Wallet Game

James C. Cox, Maroš Servátka, and Radovan Vadovič

WORKING PAPER

No. 03/2009

Department of Economics and Finance
College of Business and Economics
University of Canterbury
Private Bag 4800, Christchurch
New Zealand

WORKING PAPER No. 03/2009

Saliency of Outside Options in the Lost Wallet Game

James C. Cox [1], Maroš Servátka [2], and Radovan Vadovič [3]

January 10, 2009

Abstract: This paper reports an experiment designed to shed light on an empirical puzzle observed by Dufwenberg and Gneezy (2000) that the size of the foregone outside option by the first mover does not affect the behavior of the second mover in a lost wallet game. Our conjecture was that the original protocol may not have made the size of the forgone outside option salient to second movers. Therefore, we change two features of the Dufwenberg and Gneezy protocol: (i) instead of the strategy method we implement a direct response method (sequential play) for the decision of the second mover; and (ii) we use paper money certificates that are passed between the subjects rather than having subjects write down numbers representing their decisions. We observe that our procedure yields qualitatively the same result as the Dufwenberg and Gneezy experiment, i.e., the second movers do not respond to the change in the outside option of the first movers.

Keywords: Experimental economics, lost wallet game, outside option

JEL Classifications: C70, C91

Acknowledgements: Gary Charness, Martin Dufwenberg, and Uri Gneezy provided helpful comments and suggestions. Financial support was provided by the University of Canterbury, College of Business and Economics

[1] Department of Economics and Experimental Economics Center, Andrew Young School of Policy Studies, Georgia State University, 14 Marietta Street NW, Room 456, Atlanta, GA 30303
[2] Department of Economics and Finance, University of Canterbury, Private Bag 4800, Christchurch 8140, New Zealand
[3] Department of Economics, Instituto Tecnológico Autónomo de México, Centro de Investigación Económica, Camino a Sta. Teresa 930, Colonia Héroes de Padierna, C.P. 10700, México, D.F.

*Corresponding Author: Maroš Servátka, email: maros.servatka@canterbury.ac.nz, phone: +64-3-3642825, fax: +64-3-3642635

WORKING PAPER No. 03/2009

Saliency of Outside Options in the Lost Wallet Game

1. Introduction

In the lost wallet game (Dufwenberg and Gneezy, 2000), the first mover (FM) can choose between the actions Take and Leave. If FM chooses Take, her payoff is x and the payoff of the second mover (SM) is 0. Alternatively, if FM chooses Leave then SM can divide the amount π between the two players. So long as $\pi > x$, the FM's choice of Leave generates a surplus for the two players. SM can choose any amount $y \in [0, \pi]$ for the FM payoff and $\pi - y$ for himself. If FM chooses Leave, she gains (resp. loses) money if SM chooses $y > x$ (resp. $y < x$).[1] Arguably, the size of the FM payoff x in the Take option provides a measure of the amount of trust the FM places in SM, hence reciprocal SMs will choose amounts for FM payoffs y that increase with x. Surprisingly, Dufwenberg and Gneezy (hereafter DG) report that the size of the foregone Outside Option x does not affect SM choices of payoff amounts y for FMs. A similar observation was made by Brandts, *et al*. (2006) in a pie-sharing game.

We find this behavior puzzling for the following reasons. If SM views the Outside Option x as FM's "investment" that is necessary in order for π to be made available to SM, then a higher forgone x implies that FM is willing to invest more, which should inspire SM to return more to FM. Our question about robustness of the reported invariance of y with x hinges on the perceived salience of the amount of the Outside Option. When making her choice, the SM must be aware of the amount of FM's foregone payoff x if she is going to respond to the size of x. However, in DG (and also in Brands, *et al*.) the responses of SMs were obtained via the strategy method which does not allow SMs to observe FM choices before making their decisions. Thus the monetary consequences of the FMs' actions, which are at the heart of this puzzle, have to be imagined by the SMs at the time of their decisions.

[1] Traditional theory of self-regarding (or "economic man") preferences implies that, if given a choice, SM would choose $y = 0$, hence FM will choose Take.

To try to make the money payoff implications of both players' actions in the lost wallet game more salient, we change two features of the DG protocol: (i) instead of the strategy method we implement a direct response method (sequential play) for the decision of the SM; and (ii) we use paper money certificates that are passed between the subjects rather than having subjects write down numbers representing their decisions. In our experiment, an FM receives an envelope containing x (= 4 or 7) one-dollar certificates. If FM keeps the envelope then the game ends for that FM and the paired SM. If FM does not keep the envelope then the paired SM receives a large manila envelope containing: x one-dollar certificates in a legal-size envelope labeled "The Other Person's Certificates"; a second, *empty* legal-size envelope labeled "My Certificates"; and $20 - x$ additional one-dollar certificates paper-clipped to the outside of the two legal-size envelopes. The SM then decides how many of the total number of 20 one-dollar certificates (s)he has received to allocate to the two envelopes labeled, respectively, "The Other Person's Certificates" and "My Certificates."

It is important to highlight that in some experiments sequential play and strategy method are behaviorally equivalent, e.g., Cason and Mui (1998), Brandts and Charness (2000), Sonnemans (2000), Oxoby and McLeish (2004), and Falk and Kosfeld (2006). However, in certain environments the qualitative results can be reversed just by changing the response elicitation method (e.g., Güth, *et al*. (2001), Brosig, *et al*. (2003), Cooper and Van Huyck (2003), and Casari and Cason (2008)) or by changing the response elicitation method in combination with changing another factor such as context in which the game is played (e.g., Falk, *et al*. (2003) and Cox and Deck (2005)). The difference in behavior is usually attributed to the hot (sequential play) versus cold (strategy method) effect. The strategy method combined with a within-subjects design has also been used by Charness, *et al*. (2007) in a lost wallet game experiment conducted over the internet. Data from this experiment show a weak relationship between the size of the outside option available to the FM and the decision of the SM. Finally, Servátka and Vadovič (2008) reports that degree of inequality of payoffs in outside options has no significant effect in lost wallet games.

2. Experimental Design and Procedures

The experiment consisted of two treatments, Outside Option = 4 (henceforth, Out 4) and Outside Option = 7 (Out 7) implemented in an across-subjects design.[2] In both treatments the subjects played the lost wallet game presented in Figure 1. The FM had to choose whether to keep an envelope containing 4 or 7 one-dollar certificates or whether to send it to an anonymously paired SM. If he chose to keep the envelope, the game ended. The FM received 4 New Zealand dollars (4 NZD) or 7 NZD and the SM received 0 NZD. If the FM chose to send the envelope, the game continued. The SM then chose how to split 20 one-dollar certificates between the two of them. That is, the SM chose how many, *y*, of the 20 one-dollar certificates to give to the FM and how many, 20-*y*, of them to keep. The SM's choice determined the final payoffs. The following paragraphs explain the procedures used in the experiment in more detail.

We conducted twelve experiment sessions in July through September 2008 at the University of Canterbury in Christchurch, New Zealand. A total of 224 undergraduate subjects participated in the study. Some of the students had previously participated in economics experiments (including trust games), but none had participated in a trust game experiment within the 12 months prior to the study. On average, a session lasted about 60 minutes including the initial instruction period and payment of subjects. Subjects earned on average 19.82 NZD including the 5 NZD show up fee.[3] All sessions were hand run in a classroom.

Each session included between 16 and 22 subjects who were randomly assigned to be a Group A person (the first mover) or a Group B person (the second mover). The assignment into these groups was done by asking each person to draw a piece of paper with a written letter A or B on it from a large envelope. The classroom was divided in half. Group A persons were asked to sit anywhere on the farther side of the classroom while Group B persons were asked to sit closer to the door.

---

[2] The *x* values of 4 and 7 were chosen for the following reasons. A value larger than 7 for the high value of *x* would have encountered feasibility problems, in obtaining a large enough number of first movers who would actually choose Leave, so that second mover behavior could be observed. See below for discussion of the increase from 39 subject pairs for Out 4 to 73 subject pairs for Out 7 needed with the present values for *x*. A value smaller than 4 for the low value of *x* would have provided little opportunity cost for the second mover to be concerned about. The values of 4 and 7 correspond to values used by DG, making direct comparison possible.

[3] The adult minimum wage in New Zealand at the time of the experiment was 12 NZD per hour.

Each subject was provided with printed instructions. The subject instructions were also projected on a screen. After all subjects finished reading the instructions, the experimenters projected and read aloud a brief summary of the central features of the decision tasks in the experiment.[4] The subjects were encouraged to ask questions relating to the rules of the game at any time during the experiment. All questions were asked and answered privately.

Before the Group A people made their decisions, the Group B people left the room and followed one of the experimenters to another classroom down the hallway. Each person in Group A was then given a legal-size envelope with 4 or 7 one-dollar certificates. Then, one at a time, Group A persons went to an adjacent decision room where they were asked to make their decision in complete privacy. Each Group A person had two options:

(1) To keep the legal-size envelope with all of her/his one-dollar certificates. In this case the paired Group B person with whom (s)he was paired did not get to split any money.

(2) To send the legal-size envelope with ALL of her/his one-dollar certificates to the paired person in Group B. In that case the paired person in Group B got to split 20 one-dollar certificates between the two of them.

If the Group A person decided to keep the legal-size envelope, (s)he would put it in a large manila envelope which was provided in the decision room. If the Group A person decided to send the legal-size envelope to the paired person in Group B, (s)he would leave it on the table in the decision room and take only the manila envelope. If the legal-size envelope containing 4 or 7 one-dollar certificates was left in the decision room, it was collected by one of the experimenters before the next Group A person came to the room. This procedure ensured that Group A subjects did not learn each other's decisions.

After all participants in Group A made their decisions, the experimenters recorded them and put each legal-size envelope which was to be sent to a paired person from Group B in a large manila envelope. If a Group A person sent an envelope with 4 or 7 one-dollar certificates, the experimenters would write on the envelope "The Other Person's Certificates," add an *empty* legal-size envelope labeled "My Certificates" and paper-clip an additional 16 or 13 one-dollar certificates on the

[4] The full instructions and summary instructions are contained in an appendix to this paper.

two envelopes. If a Group A person did not send an envelope with certificates, the experimenters would put in a replacement envelope containing blank sheets of papers (not worth anything) to make the manila envelopes indistinguishable and take all envelopes to Group B. Then, one at a time, Group B persons went to a decision room. On their way to the decision room, Group B people randomly drew from among the manila envelopes and the experimenters recorded the matching. Group B people were asked to open their envelopes once they were in the privacy of the decision room.

If their manila envelope contained blank sheets of paper, it meant that their paired Group A person kept all the certificates and the Group B person had no decision to make. (S)he would then leave the manila envelope in the decision room. If the manila envelope contained 20 one-dollar certificates, the Group B person would decide how many of the certificates to give to the person in Group A and how many of them to keep. The certificates that the Group B person decided to give to the Group A person were to be put in the envelope labeled "The Other Person's Certificates." The certificates the Group B person decided to keep were to be put in the envelope labeled "My Certificates." Upon completion of the decision task, the Group B person left all of the envelopes in the decision room, from where they were collected by an experimenter after the Group B person left the decision room. The experimenter also recorded person B's decision.

Upon completion of the experiment the subjects were asked one by one to approach the experimenter in the hallway for payment of show up fees and payoffs from the game. The experimenter asked each Group A person whether (s)he wanted to see how many certificates the paired Group B person put in her/his envelope before getting paid. Each Group B person was asked to verify the number of certificates found in "The Other Person's Certificates" envelope and in the "My Certificates" envelope.[5]

[5] Two Group B subjects who participated in treatment Out 7 and left 7 one-dollar certificates in the "Other Person's Certificates" envelope said they wanted to keep all 20 but they never counted the certificates clipped on to the envelopes and just assumed there were 20 of them rather than 13. We have omitted their decisions in the statistical analysis of the data. Inclusion of the data for these two subjects would lower the amount given to FMs in the Out 7 treatment and therefore *not* change our conclusions.

3. Results

Thirty-nine subject pairs participated in our Out 4 treatment and seventy-three subject pairs in our Out 7 treatment. However, our focus is on the behavior of the SMs and so this unbalanced design generated thirty-one and thirty-five observations on the SM's behavior in the Out 4 and Out 7 treatments, respectively.

The behavior of our FMs produced a pattern consistent with results reported by DG. We observe that the higher the outside option, the fewer FMs decided to send the envelope. This difference is statistically significant in both datasets (Fisher's exact test p-value = 0.000 in both cases). Therefore, our procedure does not have an unexpected effect on the FMs' decisions.

The behavior of SMs is summarized in Table 2. On average, the SMs who drew an envelope with 20 one-dollar certificates gave to their paired FMs NZD 6.61 in Out 4 and NZD 6.00 in Out 7. This difference is statistically insignificant according to Mann-Whitney and Kolmogorov-Smirnov tests (the respective p-values are 0.71 and 0.60). Thus our experimental results are consistent with the DG finding that the size of the forgone outside option does not influence the decision of the SMs in the lost wallet game even after a different experimental procedure is used to elicit the subjects' behavior and make the outside option more salient.

4. Discussion

This paper reports an experiment designed to shed light on an empirical puzzle that the size of the foregone outside option by the FM does not affect the behavior of the SM in a lost wallet game. Our conjecture was that the DG protocol may not have made the size of the forgone outside option salient to SMs. Therefore, we ran our experiment using a direct response method where a SM is presented with the x (= 4 or 7) one-dollar certificates the FM gave up in order for the SM to be able to split 20 one-dollar certificates between the two of them. We observe that our procedure yields qualitatively the same result as the DG experiment, i.e., the SMs do not respond to the change in the outside option of the FMs.[6]

[6] This result does not contradict recent theory of reciprocal preferences (Cox, *et al.* (2007); Cox, *et al.* (2008)) because the SM's feasible sets are not MGT-ordered for different values of x.

References

Brandts, J., W. Güth, and A. Stiehler, "I Want YOU! An Experiment Studying Motivational Effects When Assigning Distributive Power," *Labour Economics* 13, 2006, 1 –17.

Brandts, J. and G. Charness, "Hot and Cold Decisions and Reciprocity in Experiments with Sequential Games," *Experimental Economics*, 2000, Vol. 2(3), 227-238.

Brosig, J., J. Weimann and C.-L. Yang, "The Hot Versus Cold Effect in a Simple Bargaining Experiment," *Experimental Economics*, Vol. 6(1), 2003, 75-90.

Casari, M. and T. N. Cason, "The Strategy Method Biases Measured Trustworthy Behavior," Purdue University working paper, 2008.

Cason, T. and V.-L. Mui, "Social Influence in the Sequential Dictator Game," *Journal of Mathematical Psychology*, 42, 1998, 248-265.

Charness, G., E. Haruvy, and D. Sonsino, "Social Distance and Reciprocity: An Internet Experiment," *Journal of Economic Behavior and Organization*, 63(1), 2007, 88-103.

Cooper, D. J. and J. B. Van Huyck, "Evidence on the Equivalence of the Strategic and Extensive Form Representation of Games," *Journal of Economic Theory*, 110, 2003, 290-308.

Cox, J. C. and C. A. Deck, "On the Nature of Reciprocal Motives," *Economic Inquiry*, 2005, 43(3), 623-635.

Cox, J. C., D. Friedman and S. Gjerstad, "A Tractable Model of Reciprocity and Fairness," *Games and Economic Behavior*, 59(1), 2007, 17-45.

Cox, J. C., D. Friedman, and V. Sadiraj, "Revealed Altruism," *Econometrica*, 76, 2008, 31-69.

Dufwenberg, M. and U. Gneezy, "Measuring Beliefs in an Experimental Lost Wallet Game," *Games and Economic Behavior*, 30, 2000, 163-82.

Falk, A., E. Fehr, and U. Fischbacher, "On the Nature of Fair Behavior," *Economic Inquiry*, 2003, Vol. 41(1), 20-26.

Falk, A. and M. Kosfeld, "The Hidden Costs of Control," *American Economic Review*, 2006, Vol. 96(5), 1611-1630.

Güth, W., S. Huck, S., and W. Müller, "The Relevance of Equal Splits in Ultimatum Games," *Games and Economic Behavior*, 37, 2001, 161-169.

Oxoby, R. and K. McLeish, "Sequential Decision Strategy Vector Methods in Ultimatum Bargaining: Evidence on the Strength of Other-Regarding Behavior," *Economic Letters*, 84, 2004, 300-305.

Servátka, M. and R. Vadovič, "Does Fairness of the Outside Option Matter?" University of Canterbury working paper, 2008.

Sonnemans, J., "Decisions and Strategies in a Sequential Search Experiment," *Journal of Economic Psychology*, 21, 2000, 91-102.

Figure 1. The Lost Wallet Game

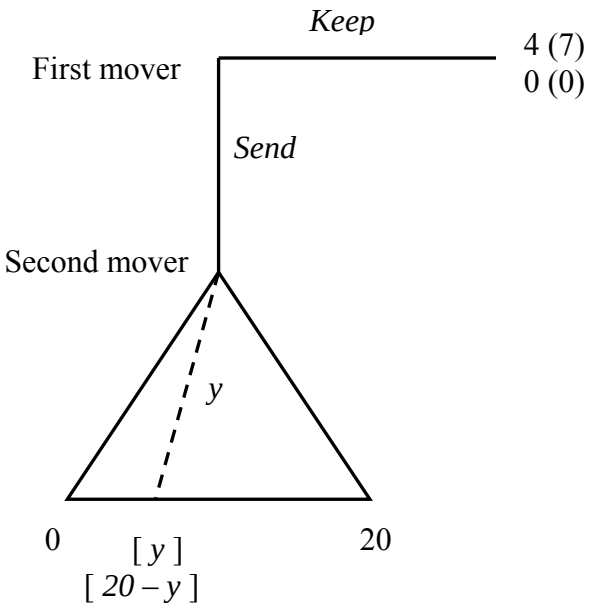

Table 1: Percentage of first movers who did not choose the outside option

	Out 4	**Out 7**
Our data	79	48
DG data	100	50

Table 2: Behavior of the second movers in our experiment

Data	Mean Amount Given to the FM	Median Amount Given to the FM	Mann-Whitney Test	Kolmogorov-Smirnov Test
Out 4	6.61 [3.19] {31}	7	-	-
Out 7	6.00 [4.09] {35}	7	-	-
Out 4 vs. Out 7	-	-	-0.38 $p = 0.71$	0.19 $p = 0.60$

Standard deviations in brackets.
Number of subjects in braces.

Appendix

INSTRUCTIONS

No Talking Allowed
Now that the experiment has begun, we ask that you do not talk. If you have a question after we finish reading the instructions, please raise your hand and the experimenter will approach you and answer your question in private.

Show up Fee
Every participant will get $5 as a show up fee, and in addition you may earn money in the experiment. All the money will be paid to you in cash at the end of the experiment.

Two Groups
You have been divided randomly into two groups, called Group A and Group B. Group A people are seated closer to the window. Group B people are seated closer to the door.

Anonymity
Each person in Group A will be randomly paired with a person in Group B. No one will learn the identity of the person (s)he is paired with.

Pairing
Your ID number is written on the top of your copy of the instructions and on the envelopes which will be provided to you. The experimenters will keep track of your decisions and your paired person's decisions by your ID numbers.

The Group A Decision Task
Before the Group A people make their decisions, the Group B people will leave the room. Each person in Group A will be given an envelope with 7 one-dollar certificates. Then, one at a time, Group A persons will go to a decision room which is just down the hallway. Over there they will be asked to make their decision in complete privacy. Each Group A person will have two options:

- To keep the envelope with ALL of his/her one-dollar certificates. In this case the paired Group B person with whom (s)he is paired does not get to split any money.

- To send the envelope with ALL of his/her one-dollar certificates to the paired person in Group B. In that case the paired person in Group B will get to split 20 one-dollar certificates between the two of them. That is, the person in Group B will decide how many of the 20 one-dollar certificates, between 0 and 20, to give to the person in Group A, and how many of them to keep. The next paragraph describes the procedure how this will be done.

If the Group A person keeps the envelope, (s)he puts it in a manila envelope which will be provided in the decision room. If the Group A person sends the envelope to the paired person in Group B, (s)he leaves it on the table in the decision room and only takes the manila envelope. This procedure ensures that the rest of Group A does not learn his/her decision.

The Group B Decision Task

After all participants in Group A have made their decisions, the experimenters will record them, and put each envelope which is to be sent to a paired person from Group B in a large manila envelope. If a Group A person has sent an envelope with 4 (7) one-dollar certificates, the experimenters will clip an additional 16 (13) one-dollar certificates on the envelope. If a Group A person has not sent an envelope with certificates, the experimenters will put in a replacement envelope containing blank sheets of papers to make the manila envelopes indistinguishable and take all envelopes to Group B. Then, one at a time, Group B persons will go to a decision room which is just down the hallway. On their way to the decision room, Group B people will randomly draw from among the manila envelopes. They will be asked to open their envelopes once they are in the privacy of the decision room.

- If their manila envelope contains **blank sheets of paper**, it means that their paired Group A person kept all the certificates and the Group B person has no decision to make. (S)he leaves the manila envelope in the decision room. Blank sheets of paper are not worth anything.

- If their manila envelope contains **one-dollar certificates**, it means that the paired Group A person gave up 4 (7) one-dollar certificates so that the Group B person could decide how many of 20 one-dollar certificates to give to the person in Group A and how many of them to keep. The next paragraph describes the procedure how this will be done.

If the Group A person has sent an envelope with 7 one-dollar certificates, the experimenters will clip an additional 13 one-dollar certificates on the envelope and the paired Group B person then decides how many of the 20 one-dollar certificates, between 0 and 20, to give to the person in Group A. The certificates that the Group B person decides to give to the paired Group A person, are put in an envelope labeled "The Other Person's Certificates". The certificates the Group B person decides to keep, are put in an envelope labeled "My Certificates". Upon completion of the decision, the Group B person leaves all of the envelopes in the decision room.

Payment of Show up Fees and Experiment Earnings

All participants in both rooms are asked to sit patiently until the end of the experiment. Once all Group B persons have made their decisions, the experimenters will record their decisions. Then you will be asked one by one to approach the experimenters in the hallway for the payment of show up fees and for redeeming cash for the one-dollar certificates you end up with. Because your decision is private, we ask that you do not tell anyone your decision nor your earnings either during or after the experiment. We also ask you to leave using the stairs and not gather in front of the elevator after you receive your payment.

Are there any questions?

SUMMARY

- A Group A person decides whether to keep or to send an envelope containing 7 one-dollar certificates to an anonymously paired person in Group B.

- If the Group A person **keeps** the envelope, (s)he receives payoff of $7 and the paired Group B person receives $0.

- If the Group A person **sends** the envelope to the paired Group B person then:

    - The experimenters clip an additional 13 one-dollar certificates on the envelope; and
    - The Group B person decides how to split 20 one-dollar certificates between the paired Group A person and him/herself.

- All decisions are made privately in the decision room down the hallway.

- One-dollar certificates can be redeemed for cash at the end of the experiment. Blank sheets of paper are not worth anything.